

What is claimed is:

1. A driving method of a liquid crystal display device, comprising:

a detection step of detecting a change of a vertical scanning frequency or a horizontal scanning frequency; and

an output step of outputting, when the change of the vertical scanning frequency or the horizontal scanning frequency is detected at the detection step, a gate-on voltage corresponding to the change.

2. A driving method of a liquid crystal display device according to claim 1, wherein at the detection step, it is judged whether the vertical scanning frequency or the horizontal scanning frequency exceeds a predetermined threshold value.

3. A driving method of a liquid crystal display device according to claim 2, wherein at the output step,

when it is judged at the detection step that the vertical scanning frequency or the horizontal scanning frequency exceeds the predetermined threshold value, a high gate-on voltage as compared with a case where the vertical scanning frequency or the horizontal scanning frequency is the predetermined threshold value or lower is outputted.

4. A driving method of a liquid crystal display device according to claim 1, wherein at the detection step,

it is judged whether the vertical scanning frequency or the horizontal scanning frequency exceeds a first threshold value,

and when it is judged that the vertical scanning frequency or the horizontal scanning frequency exceeds the first threshold value, it is judged whether the vertical scanning frequency or the horizontal scanning frequency falls below a second threshold value.

5. A driving method of a liquid crystal display device according to claim 1, wherein at the output step, the gate-on voltage is generated in accordance with the change of the vertical scanning frequency or the horizontal scanning frequency.

6. A driving method of a liquid crystal display device according to claim 1, further comprising a step of, when the change of the vertical scanning frequency or the horizontal scanning frequency is detected at the detection step, outputting a common voltage corresponding to the detected change.

7. A drive control circuit of a liquid crystal display device, comprising:

a detection circuit for detecting a change of a vertical scanning frequency or a horizontal scanning frequency; and
an output circuit for outputting, when the change of the vertical scanning frequency or the horizontal scanning

frequency is detected by the detection circuit, a gate-on voltage corresponding to the change.

8. A drive control circuit of a liquid crystal display device according to claim 7, wherein the detection circuit includes a circuit for comparing the vertical scanning frequency or the horizontal scanning frequency with a predetermined threshold value.

9. A drive control circuit of a liquid crystal display device according to claim 7, wherein the detection circuit comprises:

a first judgment circuit for judging whether the vertical scanning frequency or the horizontal scanning frequency exceeds a first threshold value; and

a second judgment circuit for judging, when it is judged that the vertical scanning frequency or the horizontal scanning frequency exceeds the first threshold value, whether the vertical scanning frequency or the horizontal scanning frequency falls below a second threshold value.

10. A drive control circuit of a liquid crystal display device according to claim 9, wherein

the output circuit outputs a first gate-on voltage when the first judgment circuit judges that the vertical scanning frequency or the horizontal scanning frequency exceeds the first threshold value,

and outputs a second gate-on voltage lower than the first

gate-on voltage when the second judgment circuit judges that the vertical scanning frequency or the horizontal scanning frequency falls below the second threshold value.

11. A drive control circuit of a liquid crystal display device according to claim 7, wherein

the detection circuit outputs a pulse width modulation signal corresponding to the vertical scanning frequency or the horizontal scanning frequency, and

the output circuit generates the gate-on voltage corresponding to a pulse width of the pulse width modulation signal.

12. A drive control circuit of a liquid crystal display device according to claim 7, further comprising a circuit for, when the change of the vertical scanning frequency or the horizontal scanning frequency is detected by the detection circuit, outputting a common voltage corresponding to the detected change.

13. A driving method of a liquid crystal display device, comprising:

a detection step of detecting a change of a vertical scanning frequency or a horizontal scanning frequency; and

an output step of outputting, when the change of the vertical scanning frequency or the horizontal scanning frequency is detected at the detection step, a common voltage corresponding to the change.

14. A driving method of a liquid crystal display device according to claim 13, wherein at the detection step, it is judged whether the vertical scanning frequency or the horizontal scanning frequency exceeds a predetermined threshold value.

15. A driving method of a liquid crystal display device according to claim 13, wherein at the detection step,

it is judged whether the vertical scanning frequency or the horizontal scanning frequency exceeds a first threshold value,

and when it is judged that the vertical scanning frequency or the horizontal scanning frequency exceeds the first threshold value, it is judged whether the vertical scanning frequency or the horizontal scanning frequency falls below a second threshold value.

16. A drive control circuit of a liquid crystal display device, comprising:

a detection circuit for detecting a change of a vertical scanning frequency or a horizontal scanning frequency; and

an output circuit for outputting, when the change of the vertical scanning frequency or the horizontal scanning frequency is detected by the detection circuit, a common voltage corresponding to the change.

17. A drive control circuit of a liquid crystal display

device according to claim 16, wherein the detection circuit includes a circuit for comparing the vertical scanning frequency or the horizontal scanning frequency with a predetermined threshold value.

18. A drive control circuit of a liquid crystal display device according to claim 16, wherein the detection circuit comprises:

a first judgment circuit for judging whether the vertical scanning frequency or the horizontal scanning frequency exceeds a first threshold value; and

a second judgment circuit for judging, when it is judged that the vertical scanning frequency or the horizontal scanning frequency exceeds the first threshold value, whether the vertical scanning frequency or the horizontal scanning frequency falls below a second threshold value.

19. A drive control circuit of a liquid crystal display device according to claim 18, wherein

the output circuit outputs a first common voltage when the first judgment circuit judges that the vertical scanning frequency or the horizontal scanning frequency exceeds the first threshold value,

and outputs a second common voltage lower than the first common voltage when the second judgment circuit judges that the vertical scanning frequency or the horizontal scanning frequency falls below the second threshold value.

20. A driving method of a liquid crystal display device, comprising:

a detection step of detecting an ambient temperature; and
an output step of outputting, when a change of the ambient temperature is detected at the detection step, a common voltage corresponding to the change.

21. A driving method of a liquid crystal display device according to claim 20, wherein at the detection step, it is judged whether the ambient temperature exceeds a predetermined threshold value.

22. A driving method of a liquid crystal display device according to claim 20, wherein at the detection step, it is judged whether the ambient temperature exceeds a first threshold value, and

when it is judged that the ambient temperature exceeds the first threshold value, it is judged whether the ambient temperature falls below a second threshold value.

23. A drive control circuit of a liquid crystal display device, comprising:

a detection circuit for detecting a change of an ambient temperature; and

an output circuit for outputting, when the change of the ambient temperature is detected by the detection circuit, a common voltage corresponding to the detected change.

24. A drive control circuit of a liquid crystal display device according to claim 23, wherein the detection circuit includes a circuit for comparing the ambient temperature with a predetermined threshold value.

25. A drive control circuit of a liquid crystal display device according to claim 23, wherein the detection circuit comprises:

a first judgment circuit for judging whether the ambient temperature exceeds a first threshold value; and

a second judgment circuit for judging, when it is judged that the ambient temperature exceeds the first threshold value, whether the ambient temperature falls below a second threshold value.

26. A drive control circuit of a liquid crystal display device according to claim 25, wherein

the output circuit outputs a first common voltage when the first judgment circuit judges that the ambient temperature exceeds the first threshold value,

and outputs a second common voltage lower than the first common voltage when the second judgment circuit judges that the ambient temperature falls below the second threshold value.

27. A driving method of a liquid crystal display device, comprising the step of:

correcting a gradation characteristic by changing a level of a reference voltage for generation of a gradation

voltage to be applied to a liquid crystal.

28. A driving method of a liquid crystal display device according to claim 27, wherein the reference voltage is an applied voltage for black display.

29. A driving method of a liquid crystal display device according to claim 27, wherein the reference voltage is an applied voltage for white display.

30. A driving method of a liquid crystal display device according to claim 27, wherein the reference voltage is an applied voltage for black display and for white display.

31. A driving method of a liquid crystal display device according to claim 27, wherein the level of the reference voltage is changed by pulse width modulation control.

32. A driving method of a liquid crystal display device according to claim 31, wherein the pulse width modulation is performed on the basis of the applied voltage to the liquid crystal and a characteristic of transmissivity.

33. A driving method of a liquid crystal display device according to claim 31, wherein the pulse width modulation is performed on the basis of variations in liquid crystal material and in liquid crystal driving electric components.

34. A driving method of a liquid crystal display device according to claim 27, wherein a variable amount of the level of the reference voltage includes a variation range of contrast.

35. A driving method of a liquid crystal display device according to claim 27, wherein the level of the reference voltage is changed in a part of one display frame.

36. A driving method of a liquid crystal display device according to claim 35, wherein a timing of changing the level of the reference voltage is between turning-ON of a gate electrode of a pixel transistor and application of a gradation voltage to a drain electrode of the pixel transistor.

37. A drive control circuit of a liquid crystal display device, comprising:

a reference voltage generating circuit for changing a level of a reference voltage for generation of a gradation voltage to be applied to a liquid crystal and outputting it.

38. A drive control circuit of a liquid crystal display device according to claim 37, wherein the reference voltage generating circuit comprises:

a pulse width modulation circuit for generating signals with different pulse widths under a predetermined condition and outputting them;

a transistor controlled by the pulse width modulation

circuit;

a power supply circuit for outputting a voltage higher than the voltage to be applied to the liquid crystal;

at least three resistors cascaded between an output terminal of the power supply circuit and ground;

a resistor connected between a connection terminal connecting the at least three resistors and a source electrode of the transistor;

a resistor connected between a connection terminal connecting the at least three resistors and different from the former connection terminal of the resistors and a drain electrode of the transistor;

a diode for input protection of the transistor; and

at least two amplifiers for voltage output.

39. A liquid crystal display device comprising a liquid crystal sealed between substrates disposed to be opposite to each other with a predetermined cell gap, further comprising a drive control circuit for driving the liquid crystal according to any one of claims 7 to 12, 16 to 19, 23 to 26, 37 and 38.